Claims

1. Weighing apparatus comprising a load cell with an RF communication means.

2. Weighing apparatus as claimed in claim 1 in which the load cell has its own power source.

3. Weighing apparatus as claimed in claim 1 wherein said RF communication is with a control device.

4. Weighing apparatus as claimed in claim 1 wherein were said RF communication is with a junction box.

5. Weighing apparatus as claimed in claim 1 were said RF communication is with a junction box and said junction box uses RF to communicate with a master controller.

6. Weighing apparatus as claimed in claim 1 were said RF communication is with a junction box, said junction box uses RF to communicate with a master controller, said load cell has its own power source, and the control device has its own power source.

7. A method of making a load cell that has an RF communication means were RF communication is with a junction box, said junction box uses RF to communicate with a master controller, said load cell has its own power source, and the control device has its own power source.

8. Weighing apparatus comprising mulitple load cells with an RF communication means.

9. Weighing apparatus as claimed in claim 8 in which the load cell has its own power source.

10. Weighing apparatus as claimed in claim 8 wherein were said RF communication is with a control device.

11. Weighing apparatus as claimed in claim 8 wherein were said RF communication is with a junction box.

12. Weighing apparatus as claimed in claim 8 were said RF communication is with a junction box and said junction box uses RF to communicate with a master controller.

13. Weighing apparatus as claimed in claim 8 were said RF communication is with a junction box, said junction box uses RF to communicate with a master controller, said load cell has its own power source, and the control device has its own power source.

14. Weighing apparatus as claimed in claim 8 wherein were said RF communication is with a control device, and said control device transmits a ping to trigger the transmission from the load cells.

15. Weighing apparatus as claimed in claim 8 wherein were said RF communication is with a control device, each said load cell transmits to another load cell which receives the data, adds its data, and transmits to the next load cell in a daisy chain to said control device.

16. Weighing apparatus as claimed in claim 8 wherein a waveguide is used.

17. Weighing apparatus comprising a counterforce, transducer means mounted on said counterforce, circuit means associated with said counterforce, said circuit means being responsive to external control and including means for producing digital representations of loads applied to said counterforce, means for applying at least one correction factor to said digital representations and means for transmitting said digital representations, means providing a sealed enclosure for said transducer means and said circuit means, and means providing a path through said enclosure means for external RF communication with said circuit means.

18. Weighing apparatus as claimed in claim 17 wherein said circuit means includes means for producing digital representations of the temperature of said counterforce, means for storing a temperature correction factor, and means for utilizing said temperature representations and said temperature correction factor to correct said digital load representations.

19. A method of making a modular digital load cell including an RF communication means, a counterforce and digital circuit means mounted on the counterforce for providing digital representations of loads applied to the counterforce, the method comprising the steps of providing a sealed enclosure for said transducer means and said digital circuit means, providing a path through said enclosure for external

communication with said digital circuit means, subjecting said counterforce to a variety of load and operating conditions and obtaining digital load representations under said conditions, utilizing said load representations to determine digital correction factors for said load cell, and storing said correction factors for use in operation of said load cell.

20. Weighing apparatus comprising a plurality of load cells, each load cell including an RF communication means, a counterforce, transducer means mounted on said counterforce, circuit means associated with said counterforce, said circuit means including means for producing digital representations of loads applied to said counterforce and means responsive to external interrogations for transmitting said digital representations, means providing a sealed enclosure for said transducer means and said circuit means, and means providing a path through said enclosure means for external communication with said circuit means, load receiving means supported by said load cells, means for interrogating said load cells to receive said digital representations, and means for combining said digital representations to produce digital representations of the total weight on said load receiving means.

21. Weighing apparatus comprising a plurality of load cells, load receiving means supported by said load cells, means associated with said load cells for providing a digital representation of a load on each load cell, means for storing a mathematical expression for load corrected for load position, means for applying said mathematical expression to said digital load representations to produce a digital representation of the total load on said load receiving means corrected for load position and means for transmitting the digital representation.

22. Weighing apparatus as claimed in claim 21 wherein said mathematical expression includes a load position correction factor for at least one of said load cells, and wherein said correction factors are combined with the corresponding digital representations to produce corrected digital representations, and any uncorrected digital representations and said corrected digital representations are combined to produce the total load on said load receiving means corrected for load position.

23. Weighing apparatus as claimed in claim 21 including control means for receiving said digital representations from each of said load cells, combining said load position correction factors with the corresponding digital representations to produce corrected digital representations and combining the corrected digital representations and any uncorrected digital representations to produce the total load on said load receiving means corrected for load position.

24. A method for compensating a multiple load cell scale for load position, said scale including means for providing a digital representation of a load on each load cell, the method comprising the steps of determining a mathematical expression for load corrected for load position, storing said mathematical expression, interrogating each of said load cells to receive said digital load representations, transmitting said digital

representations, and applying said mathematical expression to said digital load representations to produce a digital representation of the total load on the scale corrected for load position.

25. A method as claimed in claim 24 wherein said mathematical expression includes a correction factor for at least one of said load cells, and including the steps of determining the load position correction factors, storing the load position correction factors, combining the load position correction factors with the respective digital load representations to provide corrected digital load representations, and combining any uncorrected digital representations and said corrected digital load representations to provide a digital representation of the total load on the scale corrected for load position.

26. A method as claimed in claim 25 wherein the step of determining the load position correction factors for each load cell includes the steps of positioning a load at different locations on said scale, determining the responses of said load cells to said load, and utilizing said responses and said mathematical expression to determine the load position correction factors.

27. A method as claimed in claim 26 including the step of determining a fresh load position correction factor for a replacement load cell and storing said fresh load position correction factor.

28. A method as claimed in claim 27 wherein said fresh load position correction factor is determined by positioning a load on said replacement load cell, obtaining digital representations from each of the load cells, positioning the same load at another location and obtaining load representations from each of the load cells, and utilizing said load representations and the known correction factors from all but the replaced load cell to determine the value of the load position correction factor for the replacement load cell, and storing said load position correction factor for the replacement load cell.

29. In a multiple digital load cell scale having a load position correction factor stored for each load cell, a method of recompensating said scale after replacement of a load cell, comprising the steps of positioning a load on the replacement load cell and obtaining load representations from each of the load cells, positioning the same load at another location and obtaining load representations from each of the load cells, utilizing said load representations and the known correction factors from all but the replaced load cell to determine the value of the load position correction factor for the replacement load cell, transmitting and storing said new load position correction factor for the replacement load cell.

30. A method as claimed in claim 29 wherein said load placed on said replacement load cell has an unknown value.

31. A control house comprising of a master controller which is communicating with

more than one RF Weighing apparatus.
32. A scale comprising of a control house which sends and receives RF commucates from load cells using a satellite system.